Visions and Challenges in GeoAI, Ethics, and Spatial Quantum Computing

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Geographic information systems are changing rapidly as new technologies, such as advances in artificial intelligence and quantum computing, proliferate. Towards gaining a glimpse of possible new directions for the next decades, it is paramount to disseminate and discuss new research directions, challenges, and visions, that may be of broad interest to the SIGSPATIAL community. In the last few years, our community has excelled at providing a forum for such visions and challenges in dedicated Vision and Challenge tracks, leading to many visionary research directions [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21]. A goal of this newsletter is to continue and complement these visions. Three vision and challenge topics are covered in this special issue:

1. the first article is contributed by the organizers of GeoAI, the most successful ACM SIGSPATIAL Workshop of the last years, having 40+ registrations each year, and having 50+ people in the workshop room at a time. The authors survey and summarize the directions of GeoAI publications of the last three years, and provide a list of open research directions for this rapidly advancing field;

2. in the second article, Fu et al. discuss ethical issues of mining urban spatial data. They identify ethical vulnerabilities from three primary research directions of urban computing: urban safety analysis, urban transportation analysis, and social media analysis for urban events;

3. in the third article, Martin Werner introduces central aspects of quantum algorithms and explores future directions on how quantum algorithms can be used to leverage spatial and spatio-temporal algorithms. This article describes example algorithms, such as map coloring and dynamic time warping, which may benefit from advances in quantum computing.

In addition to these vision and challenge papers, this issue also proudly presents UCR-STAR, a spatio-temporal data repository that allows to browser and visualize a plethora of publicly available spatio-temporal data sets, ranging from point and polygon data on OpenStreetMap [22] to commonly used trajectory data sets such as TDrive [23] and GeoLife [24]. Such a repository is particularly useful for PhD students searching for data sets. It allows them to simultaneously explore and visualize many public data sets, and to pick the best for their research needs.

I hope the readers will enjoy this issue and find it useful in their research work. I’d also like to call upon readers to send me suggestions for news that they would like to appear in the next issues of this newsletter. If you have exciting news, visions, and challenges that you would benefit the SIGSPATIAL community, and that you would like to disseminate, please reach out to me! Finally, I want to cordially thank the authors for their excellent contributions to this issue.
References


